

CHAPTER 1

INTRODUCTION

1.1 Project Background

The City of Carlsbad's (City) existing Master Drainage and Storm Water Quality Management Plan (MDSWQMP) was prepared and adopted by City Council in March 1994 and amended in 1996. The existing MDSWQMP was prepared to assess drainage areas within the City, determine a revised fee structure to fund needed capital improvements, and meet the water quality requirements outlined in the National Pollutant Discharge Elimination System (NPDES) Permit issued by the San Diego Regional Water Quality Control Board (Order 90-42). Development fees have been collected since the fee structure was developed in 1994. Because of the change in economy, material and construction costs, and environmental mitigation costs not considered when the MDSWQMP was developed, the collected fees are inadequate to fund the needed infrastructure for master planned facilities.

Brown and Caldwell (BC) has been retained by the City of Carlsbad (City) to revise and update the existing MDSWQMP. The revisions and updates of the current master plan are described in this document. Henceforth, this document will be called the Drainage Master Plan Update (or DMP Update) and the 1994 master plan will be referred to as the MDSWQMP. Like the 1994 plan, this DMP Update contains the results of the assessment of drainage areas, an outline of existing storm drain infrastructure, and identification of needed improvements required to accommodate storm water flows resulting from new developments within the city limits. This DMP Update also provides planning level cost estimates and recommendations for developing an updated funding mechanism to ensure adequate funding exists for the construction of future drainage facilities that support proposed development. Growth projections and land use designations found in the City of Carlsbad General Plan form the basis of the recommended improvements and proposed Planned Local Drainage Area (PLDA) fees developed and reported herein. The PLDA fees were generated after thorough review of information from the City's current fiscal analysis and adhere to the current City ordinances and legal requirements for fee development.

This DMP Update differs from the MDSWQMP in that projects that are deemed essential for the proper function of the City's infrastructure, but cannot be funded with PLDA fees, are also described. These projects include rehabilitation of previously PLDA-funded improvements, Capital Improvement Projects (CIP) that are necessary to meet the City's growth management performance standards, and operations and maintenance (O&M) activities subject to environmental review. Inclusion of these "Non-PLDA" projects in this DMP Update is to facilitate a streamlined environmental review and clearance process as this DMP Update will serve as the foundation for the Programmatic Environmental Impact Report (PEIR).

1.2 Purpose and Scope

Rapid growth and subsequent development of the City has resulted in the need to reassess existing stormwater infrastructure requirements and capacity, driving the necessity of updating the MDSWQMP. The DMP Update (i.e., this document) will be a planning document that provides guidance on developing a PLDA fee program. Under such a program, fees paid by developers are used by the City to construct storm drain infrastructure required for handling the increased stormwater runoff flows resulting from impervious areas created by new developments. The fees are also used to reimburse developers that have constructed storm drain infrastructure identified as Master Planned Facilities that benefit others within a specified drainage basin.

The first set of goals of this project include (a) assessment of existing PLDA facilities, (b) identification of infrastructure deficiencies, and (c) identification of additional PLDA facilities required to accommodate new stormwater runoff flows from future developments. The second set of goals is to (a) develop three alternative PLDA fees, (b) identify the pros and cons of the PLDA alternatives, and (c) recommend an optimum fee program. The third set of goals is to identify projects that are essential for the proper function of the City's drainage infrastructure, but cannot be funded using PLDA fees. These non-PLDA funded projects include facility maintenance, repair, upgrades, and replacement; bridge rehabilitation/replacement; and priority CIP projects.

A description of the work that has been or will be performed to accomplish the goals stated earlier is presented in the following sections.

1.2.1 Review Existing Information

Existing data and reports, including the DMP, GIS standards and maps, hydrologic models, and historical inventories of drainage facilities, were reviewed to determine critical data gaps.

1.2.2 Develop PLDA Fee Program and Cost Estimates

The unique PLDA fees associated with each drainage area were assessed by reviewing data and interviewing staff from various departments within the City. Available information was used for the development of three PLDA fee program alternatives, with the preferred alternative recommended in a separate technical memorandum (TM) called, Updated Planned Local Drainage Area Fees, provided on December 28, 2006. A sensitivity analysis on the recommended alternative is presented in the TM.

1.2.3 Revise Existing Master Drainage and Stormwater Quality Management Plan

This DMP Update revises the MDSWQMP document based on existing data and analysis conducted during the tasks described earlier. This DMP Update includes an analysis of stormwater facilities, discuss results of the limited hydrologic studies, and present the recommended PLDA fee program. This DMP Update presents probable designs, construction, right-of-way acquisition and environmental impacts, mitigation measures and anticipated administrative costs for future activities. A review and assessment of the NPDES permit requirements to determine if any impacts to the DMP Update are expected, and measures that may be needed to ensure compliance.

The MDSWQMP and associated planning documents formed the basis of the City's PLDA fee program. Under the 1994 fee program, the City was divided into four planned local drainage areas corresponding to the four major drainage basins that transect the City. The PLDA fees applied to new development and redevelopment/remodels (where the building footprint increases by at least 50%). The fee structure was based upon the General Plan land use designations and developable acreage, and was payable at time of final map approval, building permit or grading permit, whichever occurred first. Developers were eligible for fee credits and/or reimbursement for the cost of constructed master planned facilities. The fee credits and/or reimbursable amounts were capped at the value of the project cost estimated in the MDSWQMP report plus an ENR cost index inflator.

Currently, developers may be able to receive reimbursement for construction costs that exceeded the estimated cost (plus inflator) in the MDSWQMP and associated PLDA fee program. However, these reimbursements can only occur after an updated DMP and fee program has been adopted by City Council.

This DMP Update contains the elements identified above and serves as the basis of analysis for the development of a Programmatic Environmental Impact Report (PEIR.) The PEIR will address potential environmental impacts associated with project buildout and recommend mitigation measures and compensatory mitigation requirements to minimize impacts of future projects. This comprehensive planning effort will provide a sufficient level of environmental analysis to address program and specific project improvements, based on available data, to minimize future project reviews. In summary, this DMP Update will be a document that will serve to address the following:

1. Assess the storm drainage facility needs of the four designated basins within the City boundaries;
2. Update proposed storm drain infrastructure cost estimates;
3. Identify needed improvements such as additional infrastructure required for accommodating storm water flows with limited hydraulic modeling for new developments within the city limits;
4. Identify new storm water facilities to service the newly developed areas or replacement of existing facilities to accommodate the growth;
5. Assess and develop recommendations for the replacement and maintenance of storm water facilities;
6. Update information on master planned facilities within the City boundaries that is compatible with the current City Geographic Information System (GIS) mapping standards;
7. Recommend an updated PLDA fee structure;

8. Incorporate non-PLDA projects, operations, and maintenance activities; and
9. Review of storm water quality requirements.

1.3 Carlsbad Drainage Areas

The City of Carlsbad was incorporated in June 24, 1952, with an official population of 6,963 and an area of approximately 7.5 square miles (4,800 acres). As the City matured, the population grew at a rate of about 400 people per year. Annexations of land took place, making small allowances for the City to grow slowly. The population grew to about 15,000, doubling its incorporated population by around 1970. Since then, the City has grown rapidly in population to 62,846 by 1990 (U.S. Census Bureau), 78,247 by 2000 (U.S. Census Bureau), and 95,146 by 2005 (State Department of Finance). Presently, growth projections to reflect growth within the geographic boundaries depends on information gathered from building permits, current economic factors that spur construction, and other data that is compiled by the city. However, based on the City's Growth Data Base for 2006/2007, it is anticipated that the City will reach 80% of build-out by the end of the 2006/2007 fiscal year. Build-out can be defined as the maximum number of dwelling units that can be constructed based on state law, zoning and subdivision ordinances within the city limits. Population density is expected to increase as development and redevelopment of the downtown area continues. To determine population growth projections, the City assumes a population growth of 2.37 people per dwelling unit. Table 1.3-1 shows projected population and number of housing units from various sources.

Table 1.3-1
PROJECTED POPULATION & NUMBER OF HOUSING UNITS

	U.S. Census Bureau*			State Dept. of Finance**	SANDAG***		
Year	1980	1990	2000	2005	2010	2020	2030
Population	35,490	62,846	78,247	98,607	107,217	120,597	128,700
Housing Units	15,352	27,119	33,717	42,086	45,321	48,975	50,728

Notes:

* U.S. Census Bureau estimates are as of April 1 of the years stated.

** State Department of Finance estimates are as of January 1 of the year stated.

*** The SANDAG (San Diego Association of Governments) housing and population estimates are from the SANDAG Final 2030 Forecast. Figures for 2030 are considered to reflect "Build-out" conditions.

The City of Carlsbad is bounded by the Pacific Ocean on the west, the City of Oceanside to the north, the Cities of Vista and San Marcos along with unincorporated areas to the east, and the City of Encinitas to the south. The City area has grown and currently covers approximately 42 square miles (26,880 acres). Due to the geographic diversity within the City, a variety of prominent creeks and lagoons traverse the city boundaries. Table 1.3-2 shows current population and approximate acreage for the City.

Table 1.3-2
POPULATION GROWTH CHART

Year	1952*	1969*	1970*	1990**	1998*	2000**	2003*	2004*	2005***
Population	6,963	13,053	15,000	62,846	73,688	78,247	90,271	94,400	98,607
Acreage	4,800	-	-	-	26,880	26,880	26,880	26,880	26,880

Notes:

* The City of Carlsbad provides Historical Records of population growth within its boundary.

** U.S. Census Bureau estimates are as of April 1 of the years stated.

*** State Department of Finance estimates are as of January 1 of the year stated.

The City is divided into four major watersheds: the Buena Vista Creek Watershed, the Agua Hedionda Creek Watershed, the Encinas Creek Watershed, and the Batiquitos Lagoon Watershed. Three of the listed watersheds become lagoons that support a variety of flora and fauna prior to discharging to the Pacific Ocean. Since these lagoons are an integral part of the City's identity, the City has committed to protecting and enhancing both the lagoons and the riparian habitats leading to them. The Encinas Creek watershed is the only one among the four listed watersheds that discharges directly to the Pacific Ocean. Also identified are the main tributaries for each basin. A map of the city limits and basin boundaries are provided on Figure 1-1. Each watershed (Basins A through D) is described briefly in the paragraphs below.

Basin A—Buena Vista Creek Watershed. This drainage area originates in the County of San Diego, northeast of the City of Vista. The creek drains a nine-mile long, two-mile wide area measuring approximately 19 square miles (12,160 acres). Several small tributaries combine into an improved channel that flows in a southwest direction, through the City of Vista. The slopes turn less steep as the creek leaves the City of Vista; runoff is finally discharged to the manmade Buena Vista Lagoon where it finds its way to the Pacific Ocean through a weir structure. Basin boundaries and sub-basins that make up the watershed are shown on Figure 1-6.

Basin B—Agua Hedionda Creek Watershed. The Agua Hedionda Creek originates south of the San Marcos Mountains and, together with its major tributary, the Buena Creek, drains an area measuring approximately 29 square miles (18,560 acres). After merging with the Buena Creek three miles downstream of the origin, the Agua Hedionda Creek runs for a few miles before mixing with Calavera Creek. The combined flow empties into the Agua Hedionda Lagoon and subsequently discharges to the Pacific Ocean. Basin boundaries and sub-basins that make up the watershed are shown on Figure 1-7.

Basin C—Encinas Creek Watershed. The Encinas Creek originates 3,000 feet east of El Camino Real and runs west to the Pacific Ocean. This drainage basin covers an area approximately four square miles (2,560 acres). The drainage course generally parallels Palomar Airport Road along an alignment just south of this roadway. Basin boundaries and sub-basins that make up the watershed are shown on Figure 1-8.

Basin D—Batiquitos Lagoon Watershed. The San Marcos Creek and the Encinitas Creek are two major watersheds that form the Batiquitos Lagoon watershed measuring about 56 square miles (36,000 acres). The former originates in the coastal mountain range near San Marcos, while the latter

originates in the mountains southwest of San Marcos. Runoff from the two watersheds is eventually discharged to the Batiquitos Lagoon, which covers about 0.95 miles (600 acres) and provides considerable storage of stormwater before discharging to the Pacific Ocean. Basin boundaries and sub-basins that make up the watershed are shown on Figure 1-9.

1.4 Carlsbad Drainage Infrastructure

When the City was incorporated in 1952, most of the population lived in downtown Carlsbad (known as the Village), bounded by Interstate 5 to the east, Garfield Street to the west, Pacific Avenue and Laguna Drive to the north and Walnut Avenue to the south, within the confines of Basin A and Basin B. Additional population pockets could be found around Interstate 5 bounded by Carlsbad Village Drive and Palomar Airport Road within the confines of Basin B, east of Interstate 5 along Camino Vida Roble and Yarrow Drive within the confines of Basin C, and south of Poinsettia Drive within the confines of Basin D. These areas can be considered the older parts of the city containing the older drainage infrastructure. Historical records and GIS information indicate culverts such as corrugated metal pipe (CMP), vitrified clay pipe (VCP), reinforced concrete pipe (RCP), and in some instances asbestos cement pipe culverts (ACP) were utilized throughout the city. It is also understood that portions of downtown have been upgraded or rehabilitated as redevelopment progressed.

1.4.1 Basin A

As the population grew, the drainage infrastructure as well as the development of Basin A increased, giving way to expansion in a southeasterly direction. Currently, it is estimated that forty-one percent of the drainage infrastructure and development within Basin A was built prior to 1980, with the remainder of construction completed between 1980 and present day. The current infrastructure supports mainly residential, along with some commercial facilities. Twenty three percent of Basin A is designated as open space. Drainage facilities within Basin A were typically made of concrete, and to a lesser extent, corrugated metal. The typical industry design service life for concrete culverts is around 50 years. It is also known that portions of the existing infrastructure are approaching the expected design service life. As development and redevelopment proceed, there may be opportunities to rehabilitate or replace aging infrastructure. The drainage infrastructure is presented in Figure 1-2.

1.4.2 Basin B

Basin B includes a portion of the downtown area developments along Interstate 5 and the area around Agua Hedionda Lagoon. These developments were constructed prior to 1980, making up twenty-seven percent of the infrastructure within Basin B. The drainage infrastructure in Basin B is mostly constructed of concrete and corrugated metal, supporting mainly residential, some commercial, and a large number of planned and existing industrial facilities. Thirty percent of Basin B is open space. Notable features are the McClellan-Palomar Airport, and the Carlsbad Raceway.

Most of the drainage infrastructure has over fifty percent of its design service life (remaining service life estimated to be 25 years) remaining; only a small portion is approaching the end of its expected

design service life. As development proceeds, there may be opportunities to perform periodic inspections and rehabilitate or replace as needed. The drainage infrastructure is presented in Figure 1-3.

1.4.3 Basin C

Eleven percent of the drainage infrastructure in Basin C was built prior to 1980. A majority of the drainage facilities within Basin C, pre-1980, are made of concrete and corrugated metal. Newer pipelines and drainage facilities are currently constructed of concrete, with the introduction of polyvinyl chloride (PVC) and high density polyethylene (HDPE) for irrigation and small diameter pipes (diameters less than 12 inches). The current infrastructure provides service mainly to residential communities and commercial and light industrial facilities. Twelve percent of the area in Basin C is designated as open space. Since most of the construction in Basin C is relatively new, current data suggest that most of the existing drainage infrastructure has a good portion of their estimated design life remaining. The drainage infrastructure is presented in Figure 1-4.

1.4.4 Basin D

Basin D contains older development that can be found along the Interstate 5 corridor, between La Costa Avenue and Palomar Airport Road. About 10 percent of the existing drainage infrastructure was built prior to 1980. Newer facilities were constructed as growth proceeded eastward. Most drainage facilities within Basin D are made of concrete. Although recently there has been the introduction of PVC and HDPE for irrigation and small diameter pipes (diameters less than 12 inches). The current infrastructure provides service to mainly residential communities, along with some commercial and planned industrial facilities (approximately 3 percent of the total area). Thirty two percent of the Basin D area is designated as open space. Since most of the construction in Basin D is relatively new, the current data suggests that most of the existing drainage infrastructure has a good portion of their estimated design life remaining. However, there may be opportunities to perform periodic inspections and rehabilitate or replace facilities as needed. The drainage infrastructure is presented in Figure 1-5.

1.5 Previous Master Plans

The City of Carlsbad commissioned the first Drainage Master Plan in 1971. However, it did not make provisions for collection of fees to support stormwater infrastructure, presuming that passing bond measures would generate enough revenue for the construction of proposed infrastructure. Unfortunately, Proposition 13 made it difficult to pass General Obligation Bonds. The 1971 Drainage Master Plan did make the recommendation to have Master Plan facilities constructed by developers, the City, the County or by funds from the Federal Government.

The second DMP was commissioned and completed in June 1980. This DMP addressed the shortfalls regarding the difficulties of passing bond measures to pay for infrastructure. Additionally, the plan deviated from levying property taxes across the board including property owners who would not benefit from Master Plan facilities. Thus, the 1980 DMP established a fee program that would be initiated upon submittal of subdivision plans. This DMP took the total cost of all the

identified master planned facilities and distributed it evenly across the total acreage within the city limits, including usable, developed, open space, transportation corridors, and public facilities. This method of calculation distributed the fee over areas that would not benefit or generate revenue, shrinking the total amount of fees that can be collected. Upon submittal of a subdivision plan, the apportioned fee created a shortfall for the funding of master planned facility infrastructure improvements. The 1980 DMP established 13 Planned Local Drainage Areas fees, three of which had zero revenue. The remaining areas had fees that ranged from \$200 to \$4445 per acre. The funding needed to cover the balance of the cost of construction would be borne by the developer as a condition for development, other funding from SANDAG and the County of San Diego, revenue generated from the Redevelopment Tax Increment Bond, or General Funds from the City.

The third DMP was commissioned by the City in 1988 to reassess the storm drainage infrastructure and update the 1980 DMP. During preparation of the plan, the Federal Government implemented new regulations that mandated stricter water quality control requirements. This altered the focus of the document towards incorporating an element of Water Quality Management.

The 1994 MDSWQMP was commissioned to analyze the planned local drainage fee areas, recommend changes to the areas, update and revise the method for calculating fees, establish new fee areas for the southern portion of the City, and reassess the “backbone” of the stormwater infrastructure (consisting mostly of drainage pipes 30-inches or larger in diameter, large concrete lined and rock lined channels, permanent sedimentation basins and miscellaneous large facilities). Finally, the 1994 document also included updated topographic mapping of the entire city at two-foot intervals, results of field survey of conformity of existing facilities with as-built plans, and recommendations on facility maintenance needs and measures to protect sensitive riparian waterways and lagoons from excessive siltation. The 1994 Plan concluded that the 43 million dollars were needed to build new drainage infrastructure. It also stated that funding could be recovered through PLDA fees. Additionally, these funding needs could be reduced by allowing developers to directly provide the required infrastructure. The recommendations of the 1994 MDSWQMP report facilitated the following:

- a. Consolidating the 13 PLDAs into 4, thus directly correlating to the four major drainage basins in the City.
- b. Expanding the PLDA fee structure to require imposition of the fee to non-subdivision remodels that increase the building footprint a minimum of 50 percent over the existing structure.
- c. Excluding constrained lands from the fee program as determined by statutes.
- d. Adopting sediment and water quality policies to meet the water quality control program as required by NPDES permit requirements.

1.6 Environmental Analysis and Permitting

This section will provide a discussion of necessary environmental clearances, the reason for the requirements, and will touch upon probable potential impacts that may be encountered for each particular basin.

1.6.1 California Environmental Quality Act Analysis

The California Environmental Quality Act (CEQA) requires state and local agencies to disclose and consider the environmental implication of their actions. It further requires agencies, when feasible, to avoid or reduce the significant environmental impacts of their decisions. An Environmental Impact Report (EIR) is an informational document designed to inform decision makers, other responsible or interested agencies, and the general public of the potential environmental effects of a proposed project. The CEQA document for the DMP Update will be prepared as a Program EIR (PEIR), as defined in Section 15168 of the CEQA Guidelines, which allows for preparation of a PEIR for a series of actions that can be characterized as one large project and are related in connection with the issuance of plans. The PEIR will address potential environmental effects of the implementation of each of the program components, as currently proposed, as well as additional types of activities and projects that are anticipated to be required to maintain the drainage system in the future. This document is intended to meet the goals, policies, and requirements of CEQA.

1.6.2 Areas of Known Concern

Within the four watersheds described above, there are a number of sensitive resources and environmental constraints that could potentially affect construction of proposed drainage facilities. Such constraints include, but are not limited to, the presence of open space preserves, wetlands and adjacent riparian areas, archaeological or historical resources, water quality impaired (or 303(d) listed) water bodies, sensitive species or habitat, or location within the Coastal Zone. Major constraints located within each basin are identified in Table 1.6-1.

Construction of facilities could potentially result in impacts to sensitive resources associated with these different constraints. A full evaluation of the potential for impacts and measures to reduce such impacts will be provided in the environmental analysis of the project. Overall, each of the basins would include proposed facilities located within the Coastal Zone and in proximity to sensitive species identified as part of the California Natural Diversity Database (CNDDDB). Basins A, B, and D include proposed facilities within flood zones or floodplains, as mapped by the Federal Emergency Management Agency (FEMA). In addition, Basins A, C, and D contain wetlands that could potentially be affected by proposed PLDA facilities. Basin A proposed facilities would potentially impact Buena Vista Lagoon and the shoreline along the Buena Vista Creek Hydrologic Area, both of which are included on the 303(d) water quality impaired list (published in 2002) established by the State Water Resources Control Board. Basin B facilities would impact Agua Hedionda Creek, and drain to Agua Hedionda Lagoon and the Buena Vista Creek shoreline as well. All three of these are included on the 303(d) water quality impaired list for 2002. While no impaired water bodies are listed within Basins C and D at this point, the list is in the process of being updated, and could be expanded to include areas within these basins. Each of the basins encompass areas identified in the Habitat Management Plan (HMP) for Natural Communities in the City of

Carlsbad, including existing and proposed hardline preserve areas, as well as existing standards areas, for which various conservation guidelines and goals have been established.

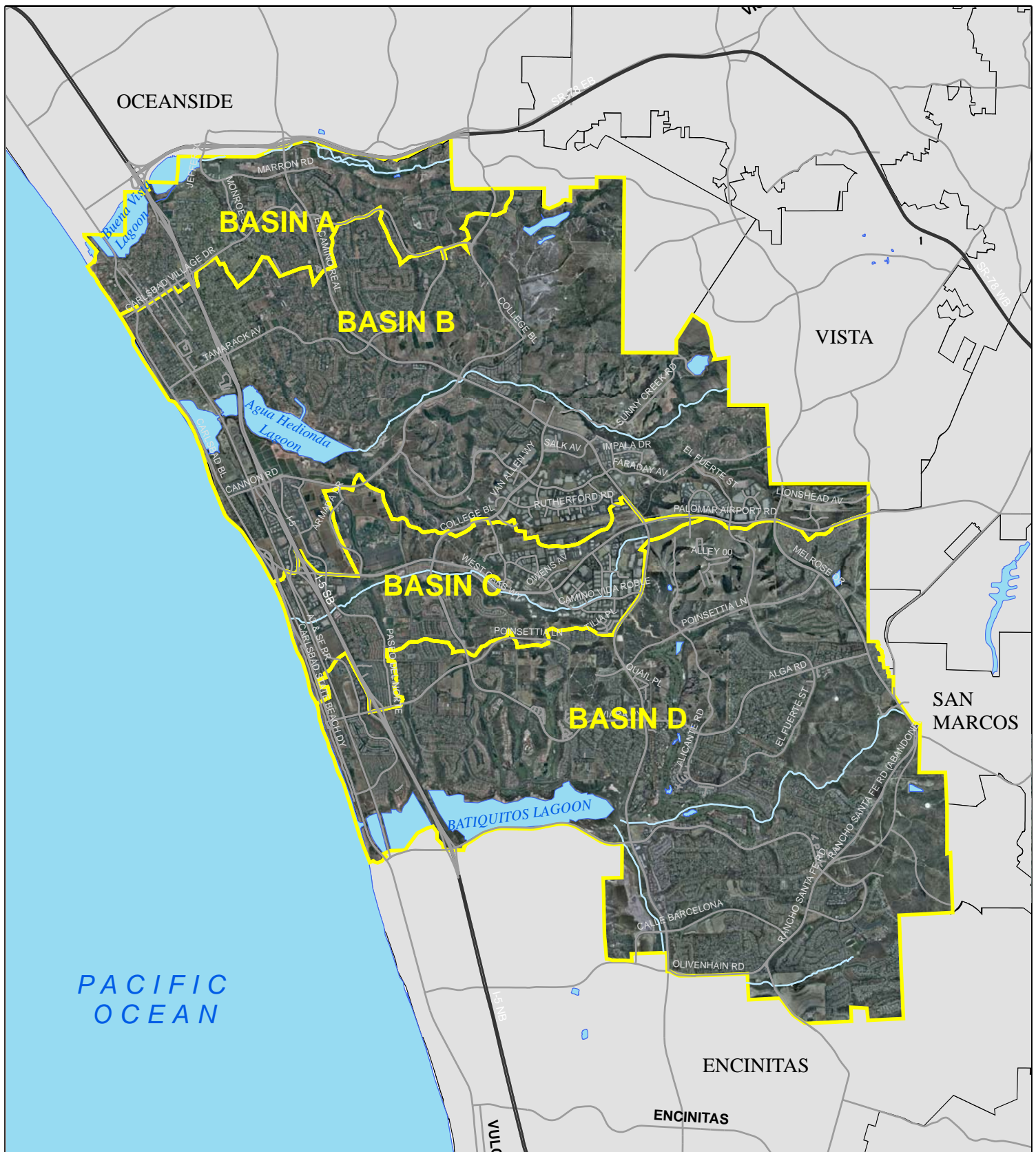
Table 1.6-1
POTENTIAL ENVIRONMENTAL CONSTRAINTS FOR EACH DRAINAGE BASIN IN THE CITY OF CARLSBAD

POTENTIAL ENVIRONMENTAL CONSTRAINTS	BASIN A	BASIN B	BASIN C	BASIN D
Coastal Zone	X	X	X	X
Flood Zone and Floodplain Boundaries	X	X		X
Wetlands	X	X	X	X
Known Sensitive Species	X	X	X	X
303(d) Listed Water Bodies	X	X		
Area of Special Biological Significance (ASBS)				
Preserve Areas within HMP				
--Hardline Preserve		X	X	X
--Proposed Hardline Preserve	X		X	X
--Standards Area	X	X		

1.6.3 Permitting

In addition to evaluation under CEQA, a number of proposed components and typical activities or projects associated with the DMP Update would potentially require permits from various regulatory agencies and may be subject to analysis under the National Environmental Policy Act (NEPA). Some of these permits could include the following:

- Coastal Development Permit for construction of facilities within the Coastal Zone
- Section 404 Permit from the U.S. Army Corps of Engineers for impacts to jurisdictional Waters of the U.S.
- 401 Water Quality Certification from the Regional Water Quality Control Board for conditions placed in the Section 404 Permit to protect water quality
- Streambed Alteration Agreement from California Department of Fish and Game due to impacts to jurisdictional wetlands or streambeds



LEGEND

- RIVERS
- FREEWAY
- MAJOR ROADS
- BODY OF WATER
- DRAINAGE BASINS



0 3,000 6,000 12,000
Feet

FIGURE 1 - 1
DRAINAGE BASIN BOUNDARIES
BASINS A, B, C, & D

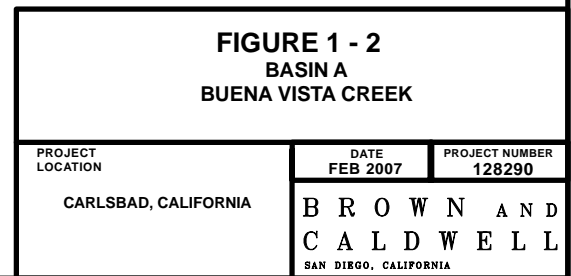
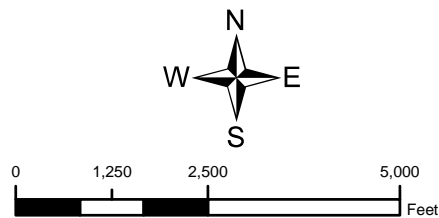
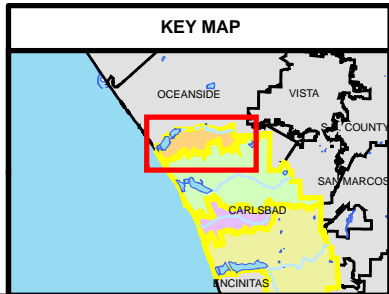
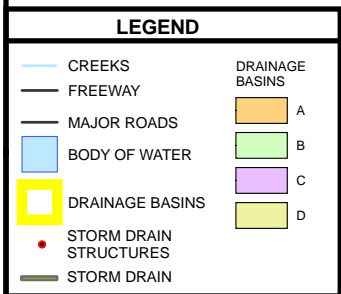
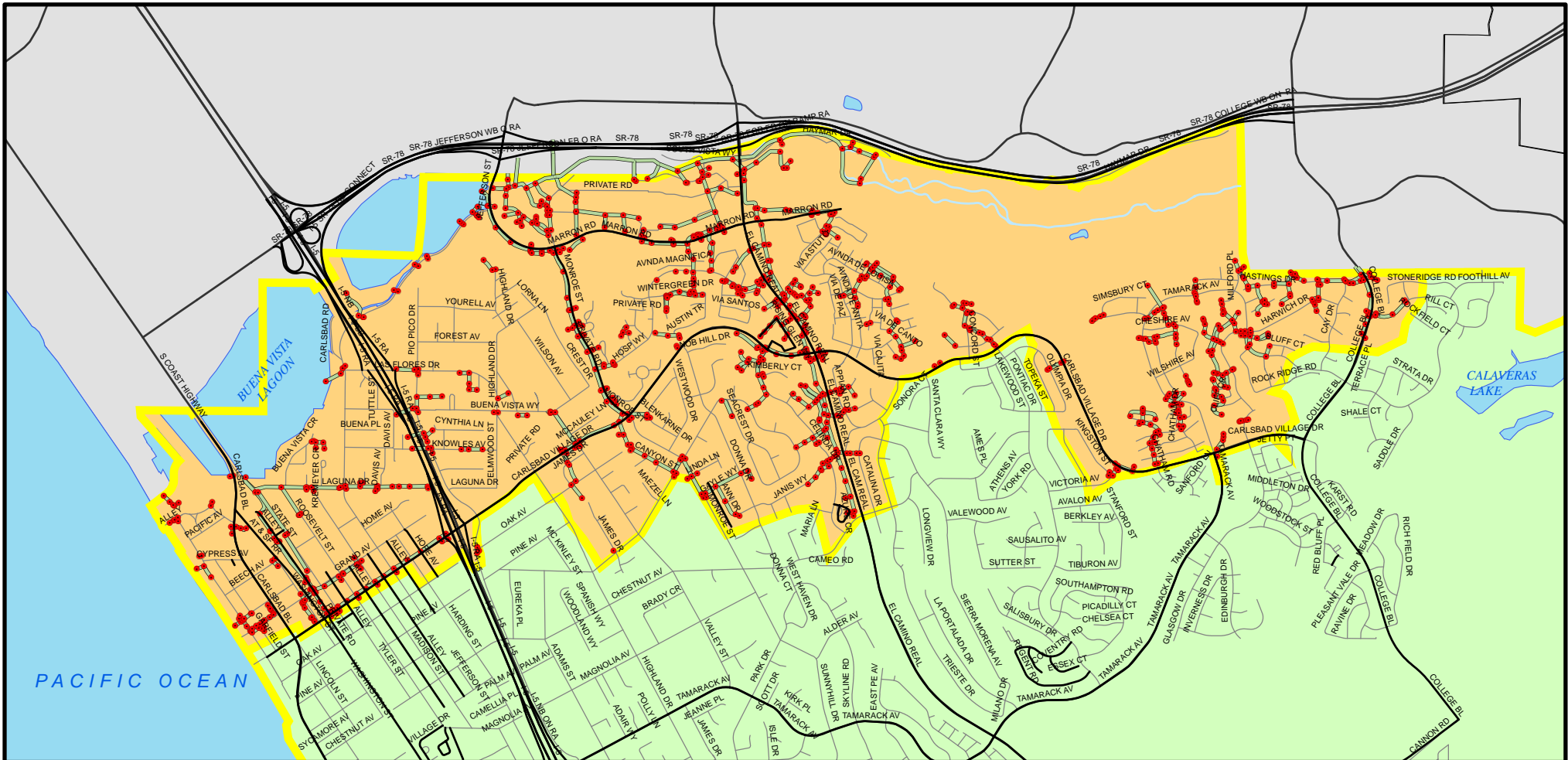
PROJECT
LOCATION

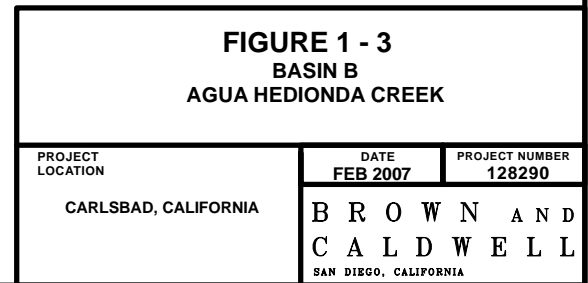
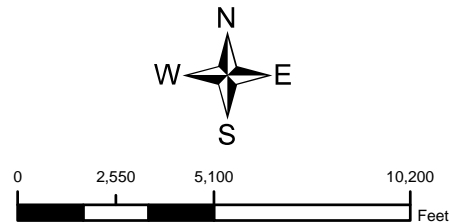
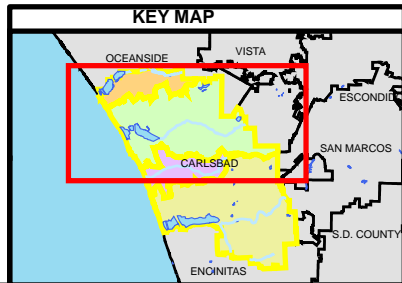
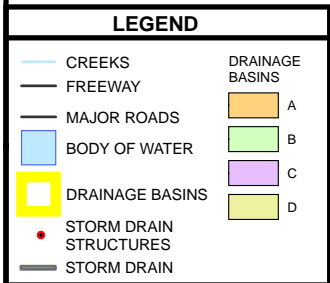
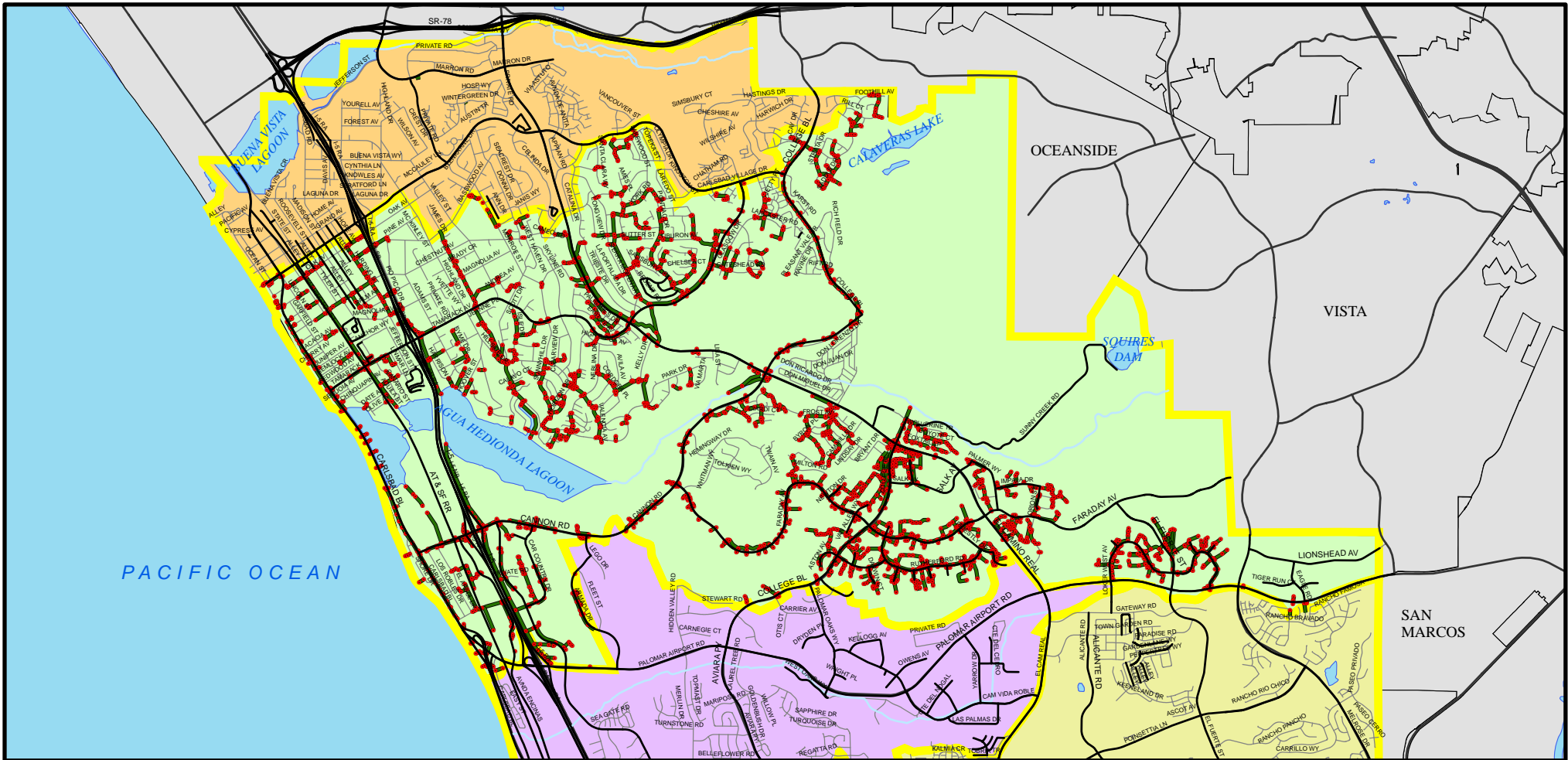
CARLSBAD, CALIFORNIA

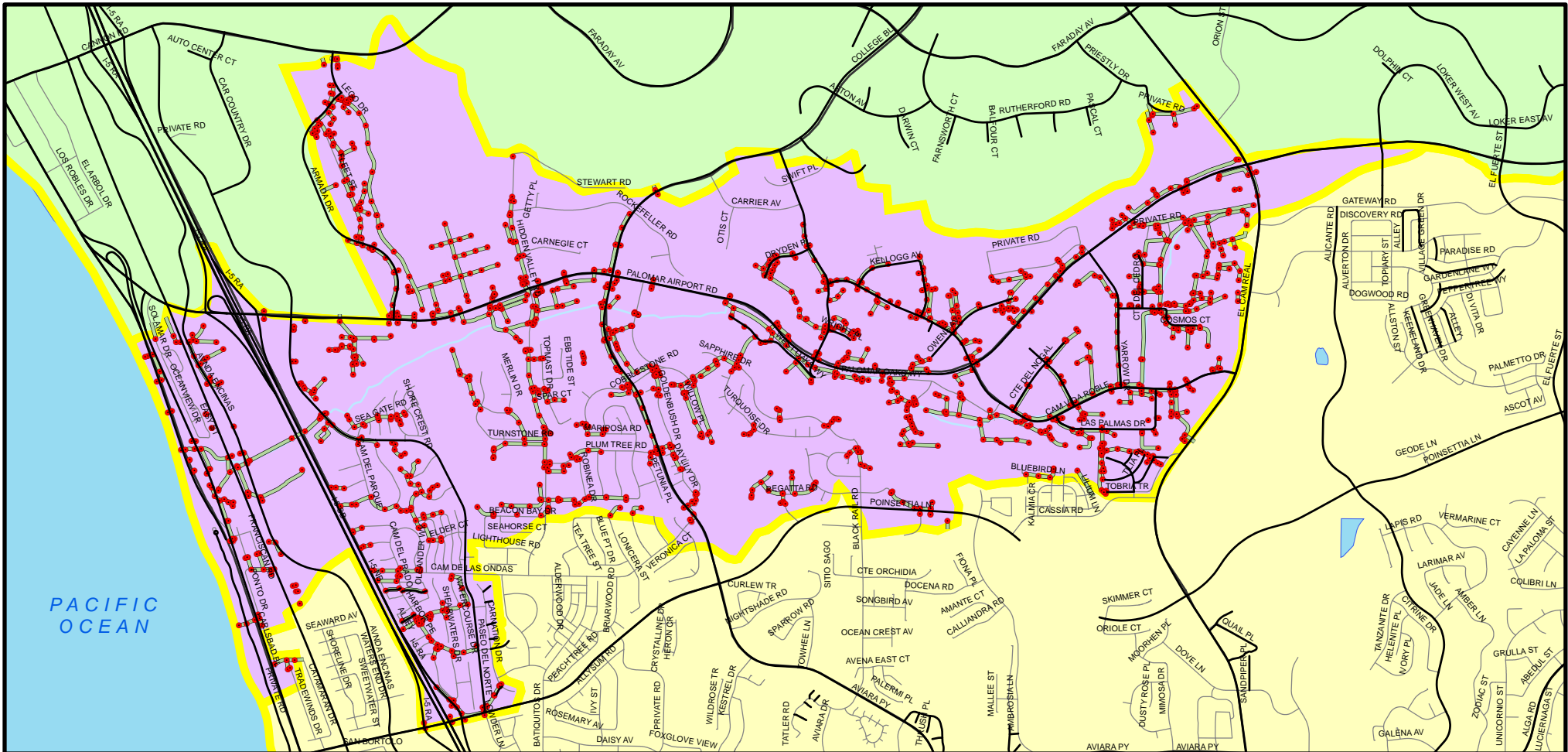
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PROJECT NUMBER
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CALDWELL
SAN DIEGO, CALIFORNIA

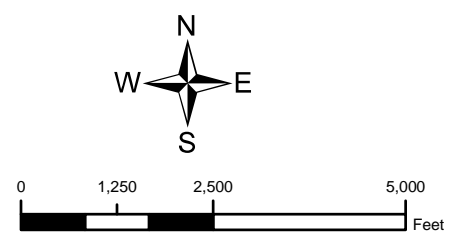
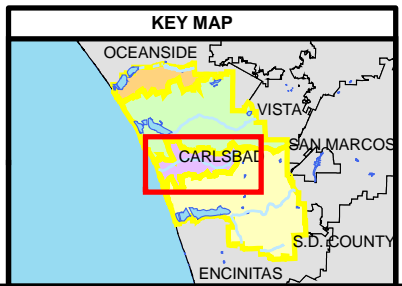






LEGEND

CREEKS	DRAINAGE BASINS A
FREEWAY	DRAINAGE BASINS B
MAJOR ROADS	DRAINAGE BASINS C
BODY OF WATER	DRAINAGE BASINS D
DRAINAGE BASINS	
STORM DRAIN STRUCTURES	
STORM DRAIN	



<p>FIGURE 1 - 4 BASIN C ENCINAS CREEK</p>		
<p>PROJECT LOCATION</p> <p>CARLSBAD, CALIFORNIA</p>	<p>DATE</p> <p>FEB 2007</p>	<p>PROJECT NUMBER</p> <p>128290</p>
<p>BROWN AND CALDWELL SAN DIEGO, CALIFORNIA</p>		

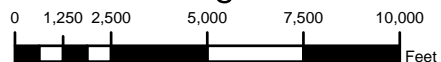
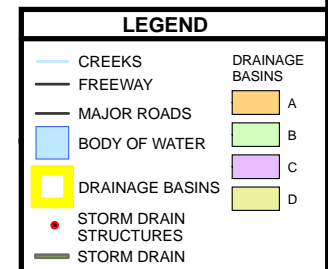
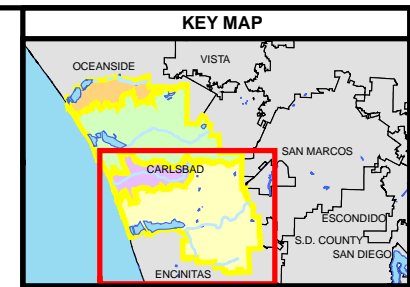
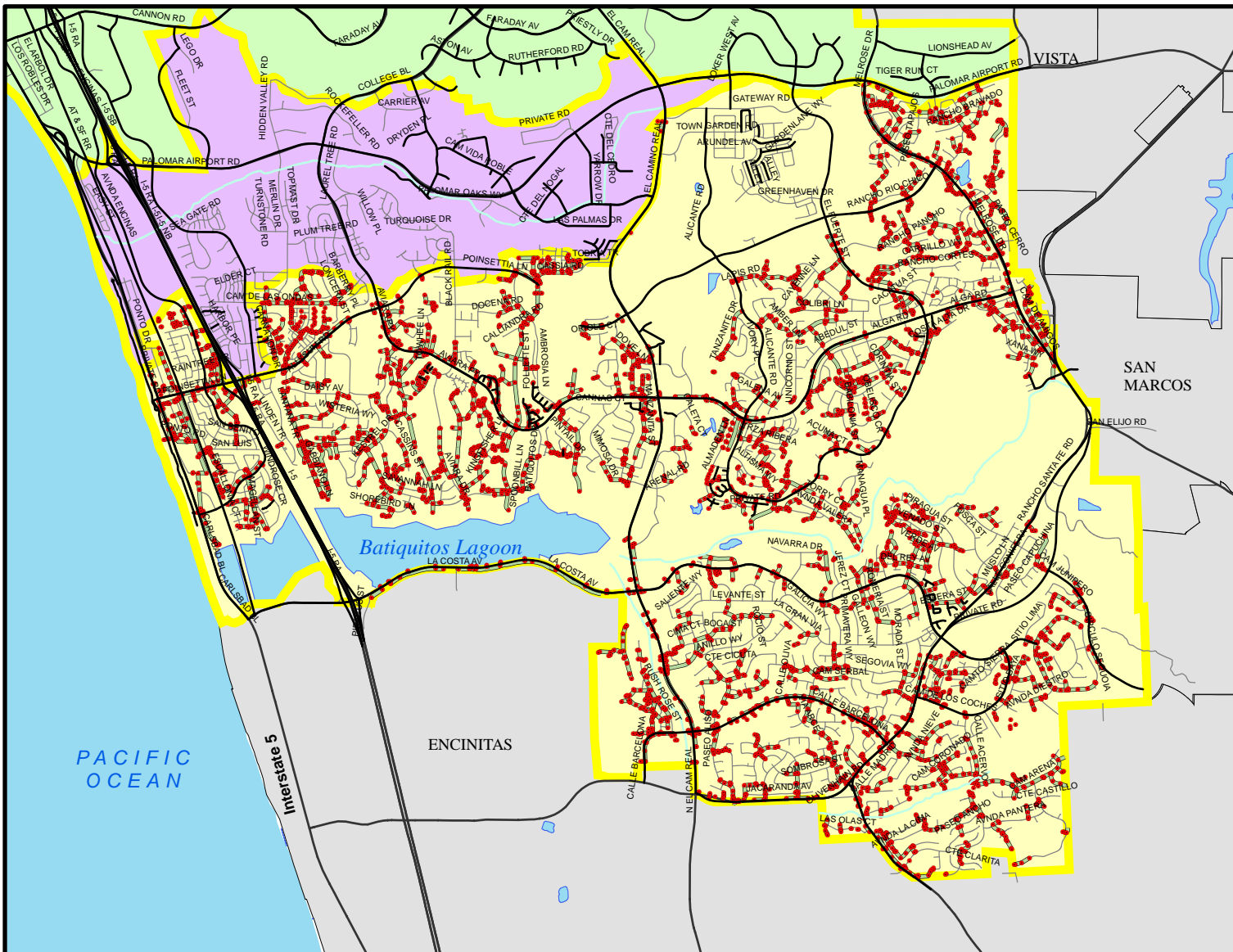
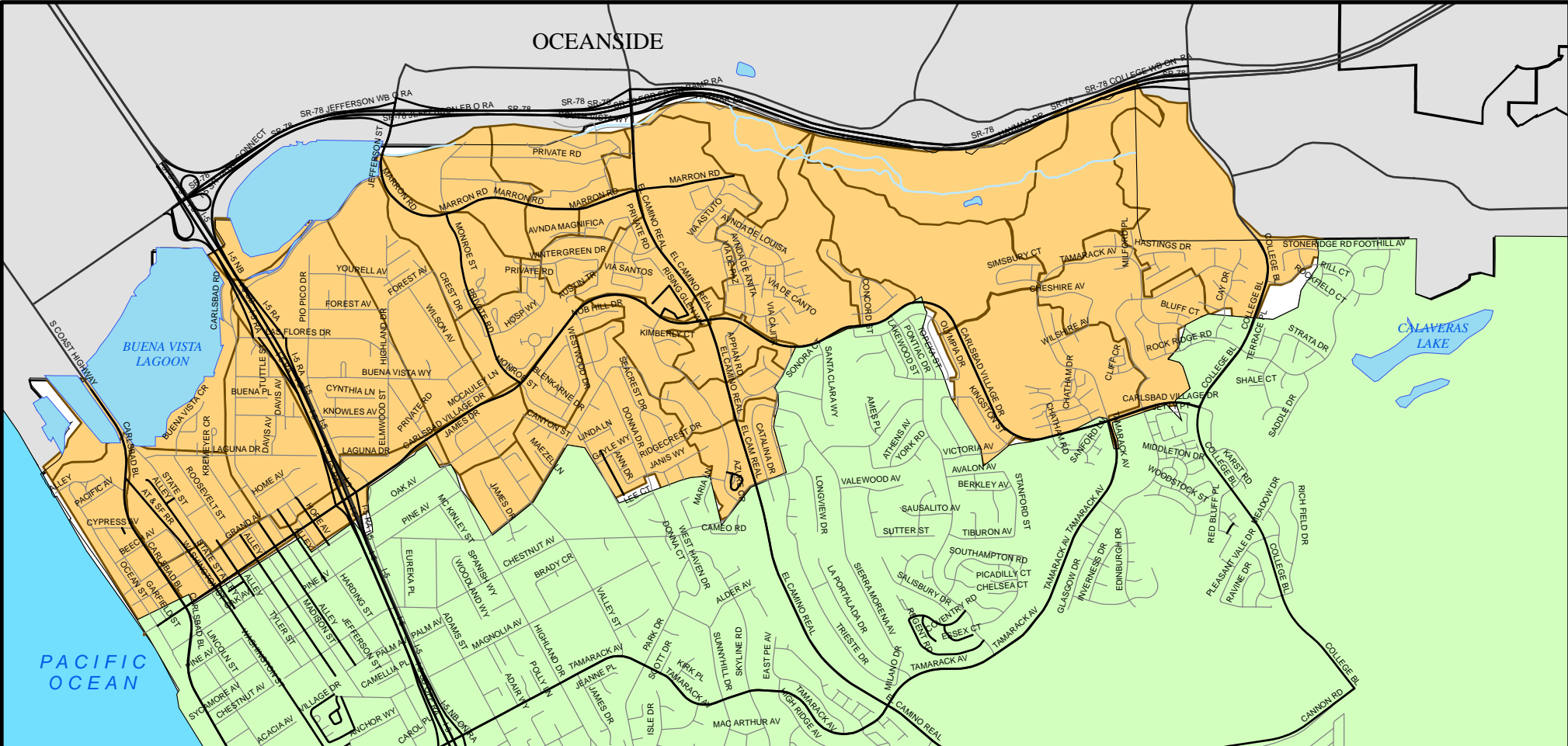


FIGURE 1 - 5
BASIN D
BATIKUITOS/ SAN MARCOS CREEK

PROJECT LOCATION CARLSBAD, CALIFORNIA	DATE FEB 2007	PROJECT NUMBER 128290
	BROWN AND CALDWELL SAN DIEGO, CALIFORNIA	



LEGEND

CREEKS	DRAINAGE BASINS A
BODY OF WATER	B
AREA NOT INCLUDED IN DRAINAGE BASIN	C
	D

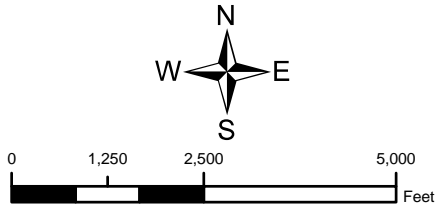
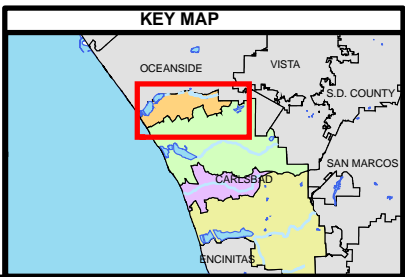
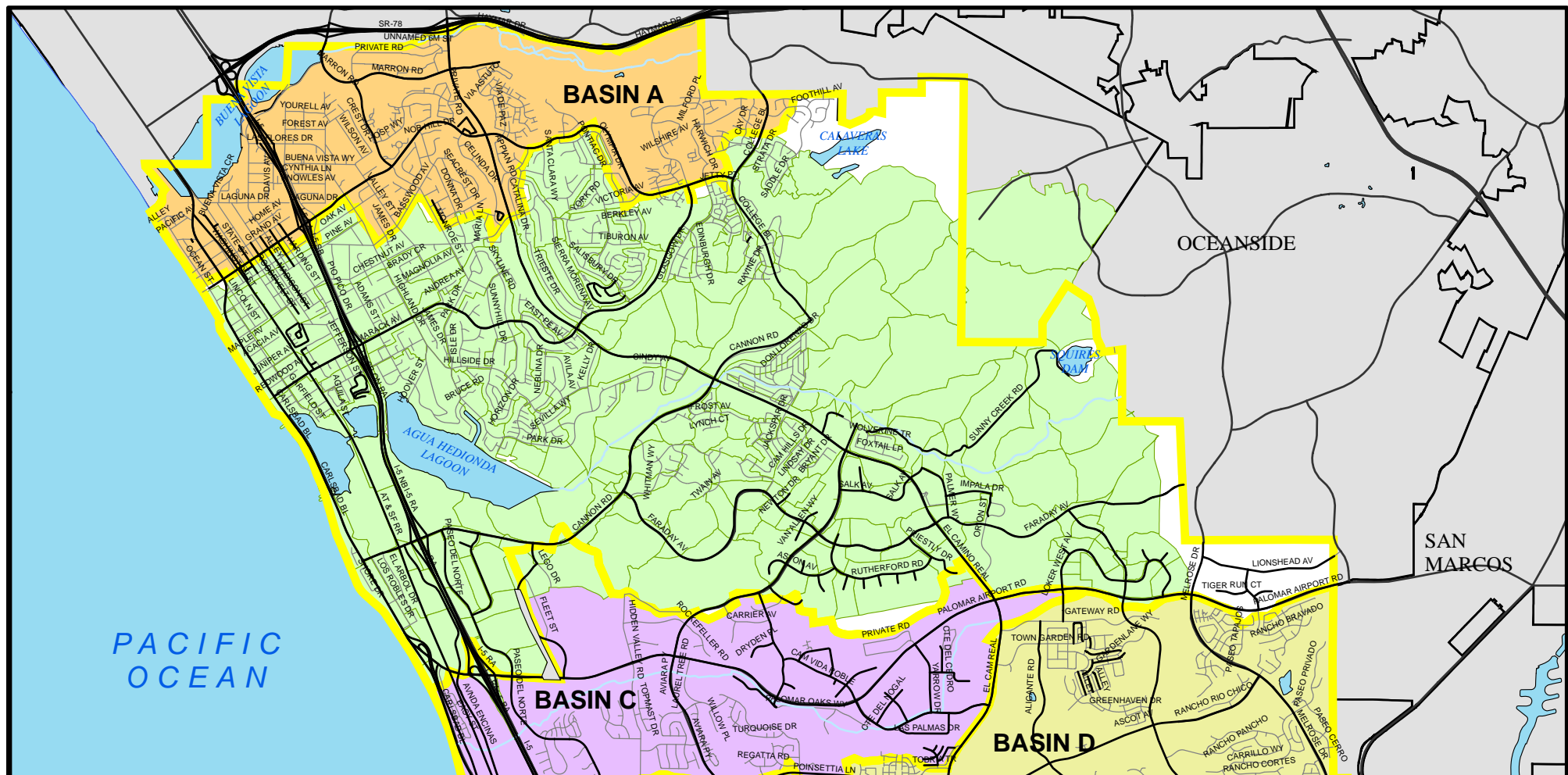


FIGURE 1 - 6
BASIN A - WATERSHED AREAS

PROJECT LOCATION CARLSBAD, CALIFORNIA	DATE FEB 2007	PROJECT NUMBER 128290
	BROWN AND CALDWELL SAN DIEGO, CALIFORNIA	



LEGEND

- CREEKS
 - BODY OF WATER
 - AREA NOT INCLUDED IN DRAINAGE BASIN
- | |
|--|
| <p>DRAINAGE BASINS</p> <ul style="list-style-type: none"> A B C D |
|--|

KEY MAP

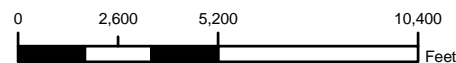
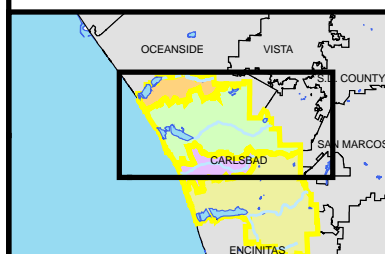
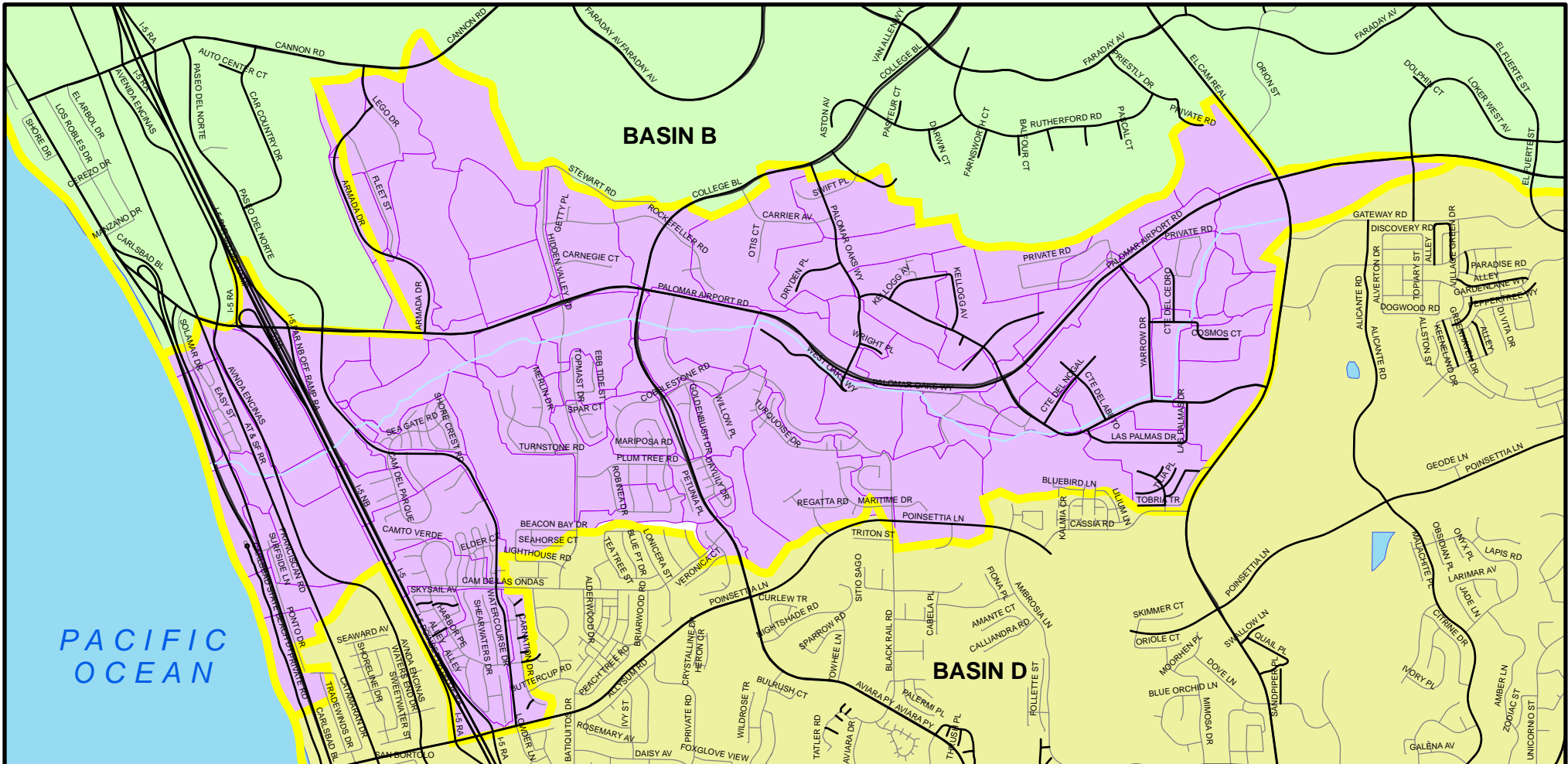


FIGURE 1 - 7
BASIN B - WATERSHED AREA
AGUA HEDIONDA CREEK

CARLSBAD, CALIFORNIA

DATE FEB 2007	PROJECT NUMBER 128290
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BROWN AND CALDWELL
 SAN DIEGO, CALIFORNIA



LEGEND

CREEKS	DRAINAGE BASINS A
BODY OF WATER	B
AREA NOT INCLUDED IN DRAINAGE BASIN	C
	D

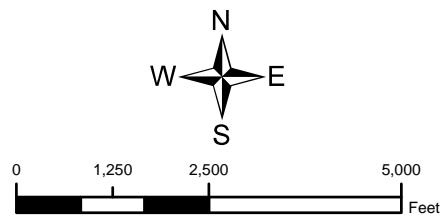
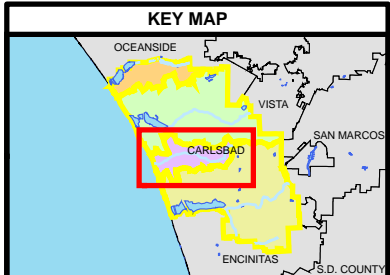


FIGURE 1 - 8
BASIN C - WATERSHED AREAS

PROJECT LOCATION CARLSBAD, CALIFORNIA	DATE FEB 2007	PROJECT NUMBER 128290
	BROWN AND CALDWELL SAN DIEGO, CALIFORNIA	

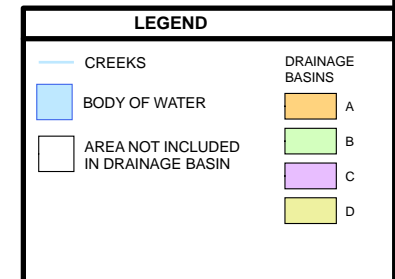
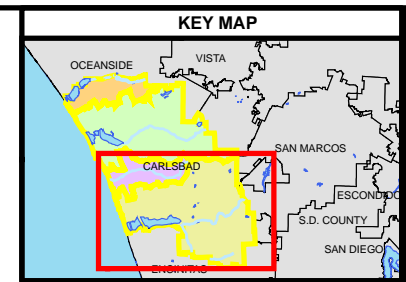
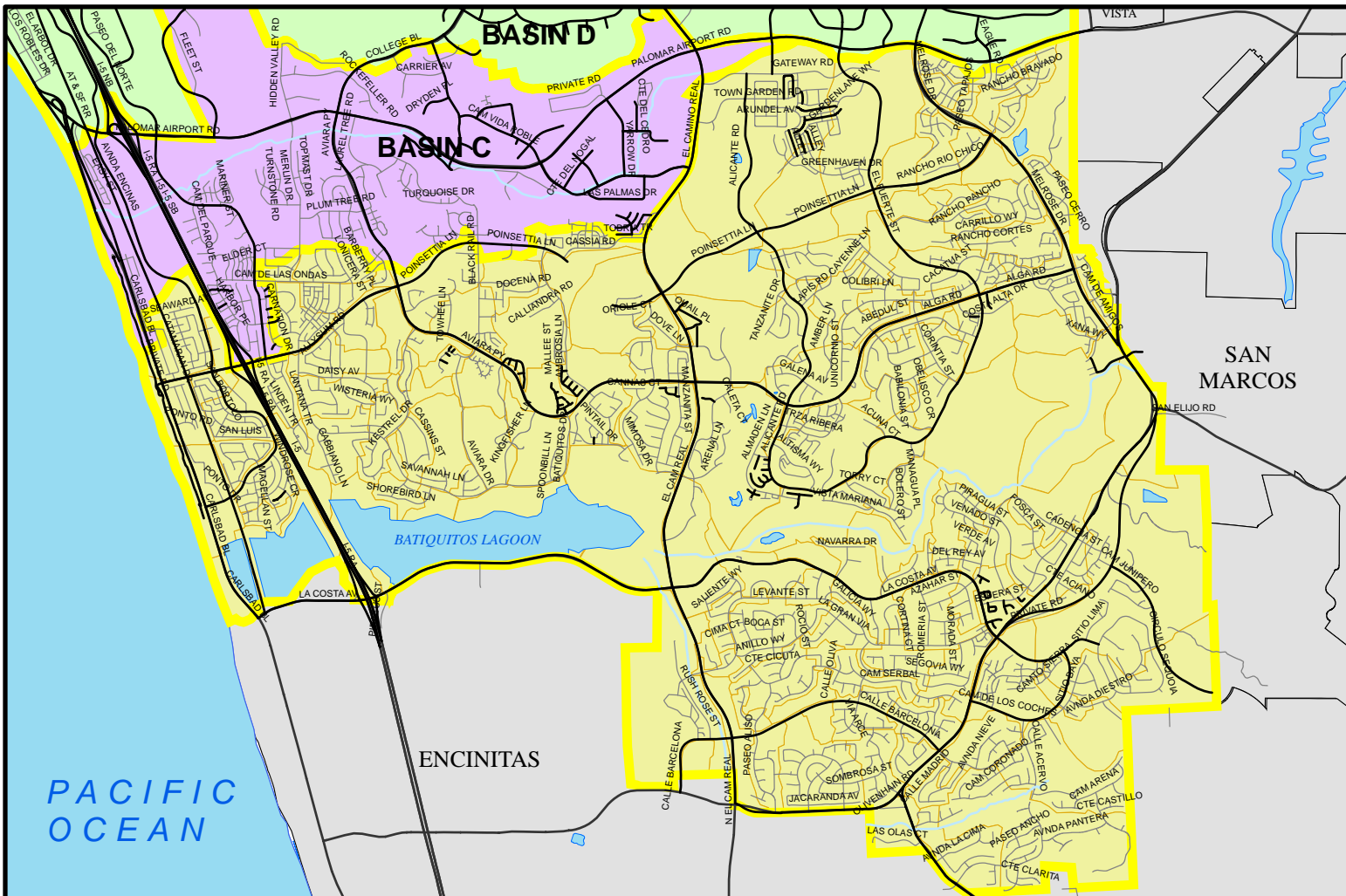


FIGURE 1 - 9
BASIN D - WATERSHED AREAS
BATIKUITOS/ SAN MARCOS CREEK

PROJECT LOCATION	DATE FEB 2007	PROJECT NUMBER 128290
	CARLSBAD, CALIFORNIA	
	B R O W N A N D C A L D W E L L SAN DIEGO, CALIFORNIA	